

**WASHINGTON DEPARTMENT OF ECOLOGY**  
**ENVIRONMENTAL ASSESSMENT PROGRAM**  
**FRESHWATER MONITORING UNIT**  
**STREAM DISCHARGE TECHNICAL NOTES**

**STATION ID:** 25E060  
**STATION NAME:** Abernathy Creek  
**WATER YEAR:** 2010  
**AUTHOR:** Casey Clishe

**Introduction**

Watershed Description

Abernathy Creek is a right-bank tributary to the Columbia River located approximately 9 miles west of Longview, Washington. Historically, the stream supported runs of coho and chinook salmon and steelhead and cutthroat trout. Land use is primarily commercial forestry with state and private holdings. Flow basalt with interbedded sandstone defines the underlying geology. Precipitation varies with elevation but typically ranges between 60 and 70 inches annually. Hydrology is almost entirely rainfall driven.

Gage Location

The gage is on the right bank near the downstream side of the Slide Creek Road bridge.

Table 1.

Drainage Area (square miles)	20.3
Latitude (degrees, minutes, seconds)	46 12 20.7 north
Longitude (degrees, minutes, seconds)	123 09 14.0 west

## Discharge

Table 2. Discharge Statistics.

Mean Annual Discharge (cfs)	94
Median Annual Discharge (cfs)	73
Maximum Daily Mean Discharge (cfs)	415
Minimum Daily Mean Discharge (cfs)	8.6
Maximum Instantaneous Discharge (cfs)	522
Minimum Instantaneous Discharge (cfs)	7.8
Discharge Equaled or Exceeded 10 % of Recorded Time (cfs)	225
Discharge Equaled or Exceeded 90 % of Recorded Time (cfs)	11
Number of Days Discharge is Greater Than Range of Ratings	2
Number of Days Discharge is Less Than Range of Ratings	0

Note: Statistics displayed in Table 2 may not include values in which the predicted discharge exceeds the range of ratings.

## Narrative

Discharge peaked in WY2010 in November 2009 with a series of moderately large to large storm events. A relative dry spell from early to mid-December followed these events. From late-December 2009 to late-May 2010, moderately large to relatively small storms fed Abernathy Creek. An almost-steady decline to base-flow conditions started in June 2010, with baseflow levels recorded in late August 2010. The record contains diel oscillations beginning in early July and persisting through August 2010. These oscillations may be due to evapotranspiration. September 2010 flows were elevated above baseflow conditions by a series of early, gentle autumn rains. Two days (November 17 and November 22, 2009) were not included in the statistical calculations of Table 2. They were excluded because some stage values recorded on those days exceeded the stage associated with twice the highest measured discharge. The absence of those days from the Table 2 calculations reduces the values shown.

## Error Analysis

Table 3. Error Analysis Summary.

Logger Drift Error (% of discharge)	1.6
Weighted Rating Error (% of discharge)	8.5
Total Potential Error (% of discharge)	10.1

## Rating Table(s)

Table 4. Rating Table Summary

Rating Table No.	7	601	
Period of Ratings	10/01-08/24	08/24-09/30	
Range of Ratings (cfs)	5.9-589	4.8-490	
No. of Defining Measurements	7	6	
Rating Error (%)	7.0	1.5	

Rating Table No.			
Period of Ratings			
Range of Ratings (cfs)			
No. of Defining Measurements			
Rating Error (%)			

Rating Table No.			
Period of Ratings			
Range of Ratings (cfs)			
No. of Defining Measurements			
Rating Error (%)			

## Narrative

Discharge measurement number 31 conducted on September 29, 2009 confirmed a rating shift from Table 6 to Table 7. Rating Table 7 persisted for most of WY2010. A relatively long phased period during baseflow conditions in the summer of 2010 ushered in another shift back to Table 601 which covered the remainder of the water year. Rating Table 601 is a replica of Table 6 applied to a different period.

## Stage Record

Table 5. Stage Record Summary

Minimum Recorded Stage (feet)	4.53
Maximum Recorded Stage (feet)	7.52
Range of Recorded Stage (feet)	2.99
Number of Un-Reported Days	2
Number of Days Qualified as Estimates	0
Number of Days Qualified as Unreliable Estimates	0

## Narrative

The stage record for WY2010 was complete and un-interrupted. The magnitude of storm events recorded were relatively small compared to past Water Years. For example, a maximum stage value for the station, recorded on January 7, 2009, was 12.56 feet. Minor discrepancies between the observed primary gage index value and the stage on the datalogger were resolved using the data-shift function.

## Modeled Discharge

Table 6. Model Summary

Model Type (Slope conveyance, other, none)	none
Range of Modeled Stage (feet)	
Range of Modeled Discharge (cfs)	
Valid Period for Model	
Model Confidence	

## Surveys

Table 7. Survey Type and Date (station, cross section, longitudinal)

Type	Date

## Activities Completed

A MS5 Hydrolab equipped with a dissolved oxygen sensor, water--temperature probe, and conductivity sensor was installed on October 7, 2009.